

Properties of Substances

I Rationale:

Properties of substances are a factor in many of the rocket systems. This lesson sequence uses a bit of chemistry, a bit of sleuthing, and some bits of candy to introduce/reinforce characteristic properties of substances. Integration of math skills is also addressed.

II Procedures:

1. Recommended Activity(s)
 - Access the following link for [“Cosmic Chemistry Understanding Elements”](http://genesission.jpl.nasa.gov/educate/scimodule/UnderElem/index.html) (<http://genesission.jpl.nasa.gov/educate/scimodule/UnderElem/index.html>.) This is a learning module that introduces students to the development of the periodic table. It includes student activities, an interactive simulation, as well as a research assignment.
 - Access the following link: [“Exploring Meteorite Mysteries”](http://ares.jsc.nasa.gov/Education/Activities/ExpMetMys/ExpmetMys.htm) (<http://ares.jsc.nasa.gov/Education/Activities/ExpMetMys/ExpmetMys.htm>)
 1. Recommended Lessons for Completion:
 1. [Lesson 2 – “Follow the Falling Meteorite” \(a practice in triangulation\)](#)
 2. [Lesson 8 – “Edible Rocks” \(properties and characteristics of substances\)](#)
 3. [Lesson 9, Station 2 \(page 3 of the PDF\) – “How Dense is Dense?”](#)

III Content Standards Addressed:

National Science Education Standards:

- **A.1.1** – Identify questions that can be answered through scientific investigations
- **A.1.2** – Design and conduct a scientific investigation
- **A.1.3** – Use appropriate tools and techniques to gather, analyze, and interpret data
- **A.1.4** – Develop descriptions, explanations, predictions, and models using evidence
- **A.1.5** – Think critically and logically to make the relationships between evidence and explanations
- **A.1.6** – Recognize and analyze alternative explanations and predictions
- **A.1.7** – Communicate scientific procedures and explanations
- **A.1.8** – Use mathematics in all aspects of scientific inquiry
- **B.3.1** – Energy is transferred in many ways
- **B.3.5** – In most chemical and nuclear reactions, energy is transferred into or out of a system. Heat, light, mechanical motion, or electricity might all be involved in such transfers
- **D.3.1** – The earth is the third planet from the sun in a system that includes the moon, the sun, eight other planets and their moons, and smaller objects, such as asteroids and comets. The sun, an average star, is the central and largest body in the solar system
- **E.2.1** – Scientific inquiry and technological design have similarities and differences

National Council of Teachers of Mathematics:

- **C.1.1** – Precisely describe, classify, and understand relationships among types of two-and three-dimensional objects using their defining properties

- **C.1.2** - Understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar objects
- **C.4.1** – Draw geometric objects with specified properties, such as side lengths or angle measures
- **D.1.1** – Understand both metric and customary systems of measurement
- **D.1.3** – Understand, select, and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume
- **E.4.1** – Understand and use appropriate terminology to describe complementary and mutually exclusive events
- **E.4.2** – Use proportionality and a basic understanding of probability to make and test conjectures about the results of experiments and simulations
- **F.1.1** – Build new mathematical knowledge through problem solving
- **F.1.2** – Solve problems that arise in mathematics and in other contexts
- **F.1.3** – Apply and adapt a variety of appropriate strategies to solve problems
- **F.4.3** – Recognize and apply mathematics in contexts outside of mathematics

National Education Technology Standards:

- **A.1.1** – Students demonstrate a sound understanding of the nature and operation of technology systems
- **A.1.2** – Students are proficient in the use of technology
- **A.2.1** – Students understand the ethical, cultural, and societal issues related to technology
- **A.2.2** – Students practice responsible use of technology systems, information, and software
- **A.2.3** – Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity
- **A.3.1** – Students use technology tools to enhance learning, increase productivity, and promote creativity
- **A.3.2** – Students use productivity tools to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative work

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